

# ANALYSIS OF THE BEHAVIOUR OF ONLINE CONSUMERS FROM THE EUROPEAN UNION: RELATIONSHIPS AND EXTREME VALUES

Ivan Marinov<sup>1</sup>

**Abstract:** The present study aims to reveal relationships and extreme values concerning online consumer activity within the European Union. The conclusions of the research are based on official statistics relating to people from the 27 EU member states who made online purchases in 2022. The study utilised analysis of variance (ANOVA) and descriptive statistical methods to analyse the grouped data from the research. In the course of the study, statistically significant correlations between sequentially selected factors, such as age, education, and digital skills of the respondents, and the dependent variable – online purchasing activity of consumers from the EU, were derived.

With the help of a box plot, it is observed that the percentages of male and female online shoppers aged between 16 and 24 years from Bulgaria, Romania and Cyprus reach moderately low extreme values in the distribution. Using the same graphical method, a moderately low extreme value of the percentage of women with higher education from Bulgaria, who made online purchases in 2022, is visualised. The percentages of online consumers who are "professionals" in the field of ICT from Cyprus, Bulgaria and Romania are abnormally low, and for "non- professionals" in this field, the percentage of online consumers from Romania appears as a moderately low extreme value. The obtained empirical results can be transformed into reference points for the formation of market strategies by traders.

**Keywords:** online commerce, online users, consumer activity, European Union.

**JEL:** L81, J11, F14, O52.

**DOI:** <https://doi.org/10.58861/tae.bm.2023.4.02>

## Introduction

As part of electronic business, electronic (online) commerce is a relatively new concept that describes the process of buying and selling

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<sup>1</sup> PhD, Head Assist. Prof., D. A. Tsenov Academy of Economics, e-mail: [i.marinov@uni-svishtov.bg](mailto:i.marinov@uni-svishtov.bg), ORCID: 0000-0002-6657-4352

goods, services, and information between economic entities through electronic networks, most commonly the Internet (Dupare & Nagpur, 2019). Some authors define it as a "completely new method of conducting trade", (Bozhinova et al., 2014), associated with the concepts of "internet economy" and "digital economy" (Tian, 2008). In this regard, presumed factors for the increasing role of e-commerce are the development of society and its digital transformation (Janna et al., 2019); (Ivanova & Marinov, 2022).

The fact that should not be neglected is that purchases related to online transactions heavily depend on trust between the parties involved (Barska, 2014).

Demographic factors such as gender, age, and education are often the subject of scientific discussions regarding their influence on consumer behaviour on the Internet (Bhatnagar & Ghose, 2004). Some researchers engage in studying, for example, the similarities and differences in adaptation, motivation, and strategies of individuals of different genders who shop online (Dittmar et al., 2004); (Pascual-Miguel, et al., 2015); (Sütütemiz & Saygılı, 2016). Other authors seek evidence for the presence or absence of homogeneity between the purchases of different generations of online consumers (Hernandez et al., 2011); (Wan et al., 2012). Education is also noted as a significant factor for online consumer activity (Rambi et al., 2014). Similar are studies by Huterska & Huterski, which, through an econometric model, reveal the existence of a statistically significant relationship between online shopping in the EU for the period 2010-2021 and selected factors, including the age, education and digital competences of buyers (Huterska & Huterski, 2022). Using similar demographic determinants, other theorists have clustered and profiled the behavior of European online users with a focus on the onset of the COVID pandemic (Ghita et al., 2022). There are also also European studies that prove that consumers with different age characteristics and digital literacy show differentiated behavior when shopping online (Baubonienė & Gulevičiūtė, 2015)

**The object** of the present study is the spread of online shopping among European consumers.

**The subject** of the study is the percentage of end users from the 27 EU member states who shopped for goods and services on the Internet in 2022 under the influence of selected socio-demographic determinants.

The author's **thesis** consists of the assertion that *key socio-demographic determinants such as age, education and knowledge in the field of information and communication technologies (ICT) have a significant*

*influence on online consumer activity in the EU member states in 2022 when taking into account extreme values that occur.*

### **Methodology of the research**

Based on evidence published in the specialized literature about the existence of statistical relationships between the prevalence of online shopping and determinants of a sociodemographic nature such as age, education and digital skills, in the present study the research interest is directed to the manifestation of this phenomenon within 27 countries of the European Union.

In a specific methodological plan, a study of the strength of the relationship between the outcome variable - prevalence of Internet shopping, and age, education and "level of digital knowledge" as factor variables is carried out. Statistical analysis includes hypothesis testing by One-way ANOVA. The series of tests carried out is based on data from Eurostat, which allows both the manifestation of the strength of the sought relationship and the highlighting of existing extreme values in individual EU countries.

The statistical analysis toolkit includes the perception of the indicator "average percentage of Internet shoppers" as a quantitative measure of the prevalence of online shopping. The analyzed indicator information is provided by data from Eurostat, and the sections - "men" and "women" are not subject to independent assessment, but are used when defining the categories of users by age and education.

Within the scope of the study, the following tasks are set:

**First.** To investigate the presence of statistically significant correlations between: the average percentage of internet shoppers among males and females from EU member states and their age (Grouping I); the average percentage of internet shoppers among males and females from EU member states and their education level (Grouping II); the average percentage of online consumers from EU member states and their level of digital literacy (Grouping III).

In support of the conclusions drawn from the ANOVA analysis, the following tests are also used: Levene's test of homogeneity of variances, Test for effect size, and Tukey's multiple comparison test.

**Second.** To check for extreme values in the intended group observations.

**Third.** To draw conclusions and generalisations by analysing the results obtained from the calculation procedures in the statistical software.

The empirical data used for the purposes of the study were collected from the information database of the official statistical service Eurostat, section 'e-commerce' (Eurostat, 2022). The calculations, on which the analysis and results are based, are performed using the tools of the SPSS software package.

## Research results

Firstly, the task is to establish the presence of a statistically significant relationship between the average percentage of men and women from the EU who made online purchases in 2022 and their age.

The summary data from Table 1 shows that the average percentage of men and women from the EU who made online purchases in 2022 differs across individual age categories. The group of women from 16 to 24 years of age (69.7%) has the highest average value of the dependent variable, and the group of women from 55 to 74 years of age (32.2%) has the lowest. It can be seen from the results that the oldest consumers from both genders shop online significantly less frequently than representatives of the other age groups.

*Table 1.*  
*Observation Report (I)*

<b>Report</b>			
Percentage of men and women who made purchases on the Internet in 2022			
Groups	Mean	N	Std. Deviation
Men, from 16 to 24 years	61.243	26	13.2946
Women, from 16 to 24 years	69.662	26	13.0691
Men, from 25 to 54 years	63.646	27	15.5282
Women, from 25 to 54 years	68.913	27	15.3253
Men, from 55 to 74 years	35.221	27	18.8827
Women, from 55 to 74 years	32.164	27	17.0693
Total	55.013	160	21.9202

*Source:* (Eurostat, 2022)

The task of establishing a statistically significant relationship between the percentage of men and women who made online purchases and their age requires formulating the following hypotheses:

• $H_0$ : there is no statistically significant relationship between the percentage of men and women from the EU who made online purchases in 2022 and their age.

• $H_1$ : there is a statistically significant relationship between the percentage of men and women from the EU who made online purchases in 2022 and their age.

The problem is solved using One-Way ANOVA, and the  $p$ -value of the test in the column "Sig" plays a crucial role in accepting or rejecting the null hypothesis  $H_0$ . From the data in Table 2, it is seen that  $p < \alpha = 0.05$ , therefore  $H_0$  is rejected and the alternative  $H_1$  is accepted.

Table 2.

ANOVA Table

		Sum of Squares	df	Mean Square	F	Sig.
Percentage of men and women who made purchases on the Internet in 2022 * Groups	Between (Combined) Groups	38488.649	5	7697.730	31.270	0.000
	Within Groups	37910.311	154	246.171		
	Total	76398.960	159			

ANOVA (I)

Source: (Eurostat, 2022)

Once a statistically significant relationship between the independent and dependent variables is established, the next step is to measure the strength of this relationship. For this purpose, the coefficient of determination Eta Squared ( $\eta^2$ ) is calculated, which is 0.504 or 50.4% (Table 3). The result can be interpreted as follows: 50.4% of the variations in the percentage of men and women from the EU who made online purchases are determined by their belonging to specific age groups. After comparing the empirical and theoretical values of  $\eta^2$ , the relationship between the factor and the outcome can be considered as very strong (Cohen, 1988).

Table 3.

*Strength of the relationship between the percentage of men and women who made online purchases in 2022 and their age (I)*

Measures of Association

	Eta	Eta Squared
Percentage of men and women who made purchases on the Internet in 2022 * Groups	0.710	0.504

Source: (Eurostat, 2022)

Determining the appropriate Post hoc test requires establishing whether there is equality between the variances in the age groups. The Levene's test of homogeneity of variances of the dependent variable in the individual groups checks the following hypotheses:

- $H_0$ : there is equality between the variances in the age groups of men and women from the EU who made online purchases in 2022.
- $H_1$ : the variances of the individual age groups are different.

*Table 4.*  
*Levene's Test of Homogeneity of Variances. (I)*

**Test of Homogeneity of Variances**

Percentage of men and women who made purchases on the Internet in 2022

Levene Statistic	df1	df2	Sig.
1.788	5	154	0.118

Source: (Eurostat, 2022)

The obtained results for the equality of variances lead to accepting the null hypothesis  $H_0$ , since the significance coefficient  $p = 0.118$  or  $p > \alpha = 0.05$ . This means that it is confirmed that the variances in the individual groups are equal (Table 4).

Considering the results from the test for homogeneity of variances, the Tukey test is chosen for conducting pairwise group comparisons, which is applicable in our case (Table 5). The presence of statistically significant differences between a pair of groups is indicated with an asterisk (\*). When there is a statistically significant difference between individual pairs of groups, the significance coefficient  $p \leq 0.05$  (column Sig.). The conclusions that can be drawn from the data in the table for multiple comparisons are that there is a statistically significant difference separately between the groups of men and women aged 55 to 74 years and all the other age groups. Evidence for this is the value of the significance coefficient,  $p < 0.05$  from the Sig. column. In the remaining pairwise comparisons of age groups, it can be observed that there is no statistically significant difference and accordingly,  $p \geq 0.05$ .

**Table 5.**  
**Multiple Comparisons (I)**

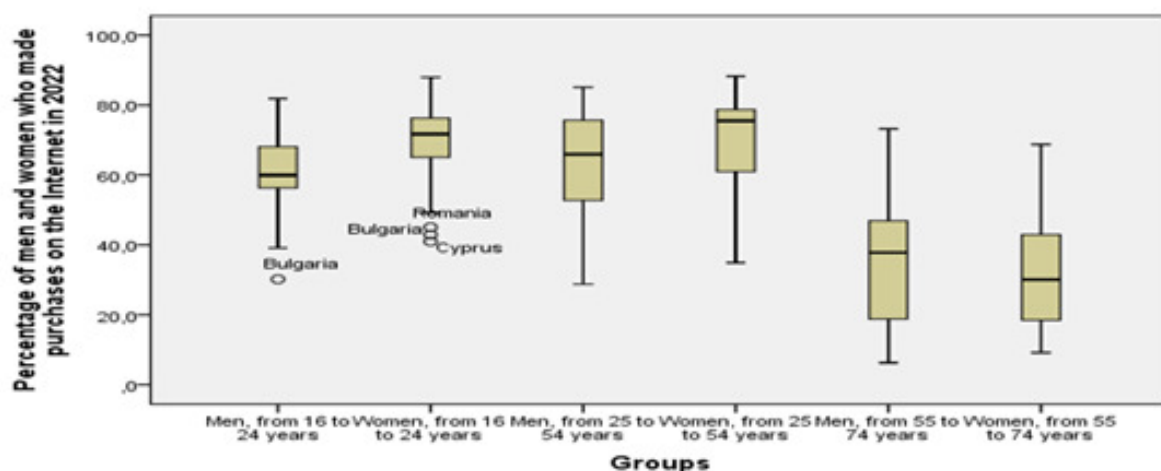
<b>Multiple Comparisons</b>						
Dependent Variable: Percentage of men and women who made purchases on the Internet in 2022						
Tukey HSD						
(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Men, from 16 to 24 years	Women, from 16 to 24 years	-8.4192	4.3516	.385	-20.978	4.139
	Men, from 25 to 54 years	-2.4029	4.3111	.994	-14.844	10.039
	Women, from 25 to 54 years	-7.6703	4.3111	.482	-20.112	4.771
	Men, from 55 to 74 years	26.0212*	4.3111	.000	13.580	38.463
	Women, from 55 to 74 years	29.0782*	4.3111	.000	16.637	41.520
Women, from 16 to 24 years	Men, from 16 to 24 years	8.4192	4.3516	.385	-4.139	20.978
	Men, from 25 to 54 years	6.0164	4.3111	.730	-6.425	18.458
	Women, from 25 to 54 years	.7490	4.3111	1.000	-11.693	13.191
	Men, from 55 to 74 years	34.4404*	4.3111	.000	21.999	46.882
	Women, from 55 to 74 years	37.4975*	4.3111	.000	25.056	49.939
Men, from 25 to 54 years	Men, from 16 to 24 years	2.4029	4.3111	.994	-10.039	14.844
	Women, from 16 to 24 years	-6.0164	4.3111	.730	-18.458	6.425
	Women, from 25 to 54 years	-5.2674	4.2702	.820	-17.591	7.056
	Men, from 55 to 74 years	28.4241*	4.2702	.000	16.100	40.748
	Women, from 55 to 74 years	31.4811*	4.2702	.000	19.157	43.805
Women, from 25 to 54 years	Men, from 16 to 24 years	7.6703	4.3111	.482	-4.771	20.112
	Women, from 16 to 24 years	-.7490	4.3111	1.000	-13.191	11.693
	Men, from 25 to 54 years	5.2674	4.2702	.820	-7.056	17.591
	Men, from 55 to 74 years	33.6915*	4.2702	.000	21.368	46.015
	Women, from 55 to 74 years	36.7485*	4.2702	.000	24.425	49.072
Men, from 55 to 74 years	Men, from 16 to 24 years	-26.0212*	4.3111	.000	-38.463	-13.580
	Women, from 16 to 24 years	-34.4404*	4.3111	.000	-46.882	-21.999
	Men, from 25 to 54 years	-28.4241*	4.2702	.000	-40.748	-16.100
	Women, from 25 to 54 years	-33.6915*	4.2702	.000	-46.015	-21.368
	Women, from 55 to 74 years	3.0570	4.2702	.980	-9.267	15.381

Women, from 55 to 74 years	Men, from 16 to 24 years	-29.0782*	4.3111	.000	-41.520	-16.637
	Women, from 16 to 24 years	-37.4975*	4.3111	.000	-49.939	-25.056
	Men, from 25 to 54 years	-31.4811*	4.2702	.000	-43.805	-19.157
	Women, from 25 to 54 years	-36.7485*	4.2702	.000	-49.072	-24.425
	Men, from 55 to 74 years	-3.0570	4.2702	.980	-15.381	9.267

\*. The mean difference is significant at the 0.05 level.

Source: (Eurostat, 2022)

The next task is to identify the outlier values of the dependent variable concerning the rest of the observations in the sample. Outlier values are those that fall outside the "whiskers" of the box plot (Figure 1). In practice, it is tracked whether there are abnormal variables with percentage values significantly higher or lower than the rest of the observations in the sample. For this purpose, a box plot is constructed for the first grouping, showing the presence or absence of outlier values.



Source: (Eurostat, 2022)

Figure 1. Box Plot (I)

On the box plot, several "moderately" low outlier values are marked with the symbol „o“. Such values represent the percentage of men aged between 16 and 24 years from Bulgaria. Moderately low outlier values are also observed for the percentages of women from Bulgaria, Romania and Cyprus in the same age group. This indicates significantly fewer online users, both men and women, aged between 16 and 24 years in these countries compared to the same indicator for the rest of the EU countries.



The next step in the analysis aims to determine whether the level of education of men and women in the EU has an impact on their online consumer activity. When considering user activity on the Internet by gender, in the separate groups it can be seen that the highest percentage are women from the EU with a higher education (74%), while the percentage of female users with a primary education is the lowest (35.2%). The results show that the percentage of online users from different genders, but within the same educational category, is approximately equal (Table 6).

*Table 6.*  
*Observation Report (II)*

**Report**

Percentage of men and women with different education, who made purchases on the Internet in 2022.

Groups	Mean	N	Std. Deviation
Men with low formal education	36.350	27	15.9819
Women with low formal education	35.234	27	17.3041
Men with medium formal education	53.773	27	16.5690
Women with medium formal education	54.652	27	16.3437
Men with high formal education	72.476	27	12.7727
Women with high formal education	73.968	27	11.9472
Total	54.409	162	21.4895

Source: (Eurostat, 2022)

During the analysis, we again formulate hypotheses to determine whether there is a statistically significant relationship between the percentage of men and women from the EU who made online purchases in 2022 and their education.

- $H_0$ : there is no statistically significant relationship between education and the percentage of men and women from the EU who made online purchases in 2022.

- $H_1$ : there is a statistically significant relationship between education and the percentage of men and women from the EU, who made online purchases in 2022.

The information in the Sig. column of Table 7 shows that  $p < 0.05$ , which satisfies the condition to reject the null hypothesis  $H_0$  and to claim that the education level is a statistically significant determinant of the percentage of men and women from the EU, who made online purchases in 2022.

*Table 7.  
ANOVA (II)*

**ANOVA Table**

			Sum of Squares	df	Mean Square	F	Sig.
Percentage of men and women with different education who made purchases on the Internet in 2022. * Groups	Between Groups	(Combined)	37887.515	5	7577.503	32.420	0.000
	Within Groups		36461.754	156	233.729		
	Total		74349.269	161			

Source: (Eurostat, 2022)

When measuring the strength of the relationship between education and purchasing activity of men and women from the EU on the Internet in 2022, it is observed that  $\eta^2$  takes the value of 0.51 or 51% (Table 8). In this case, 51% of the difference in the percentages of men and women from the EU who made online purchases in 2022 is attributed to their education, and the relationship between the dependent and independent variables can be assessed as very strong.

*Table 8.  
Strength of the relationship between the percentage of men and women who made online purchases in 2022 and their education (II)*

**Measures of Association**

	Eta	Eta Squared
Percentage of men and women with different education who made purchases on the Internet in 2022. * Groups	0.714	0.510

Source: (Eurostat, 2022)

To determine between which mean values of the educational groups there is a statistically significant difference, a Post hoc test is chosen again, and the following hypotheses are formulated:

- $H_0$ : there is no difference in the variances among the individual educational categories;

- $H_1$ : The variances among the individual educational groups are different.

The data from the Levene's test of homogeneity of variances indicate that the test is not significant, and the null hypothesis  $H_0$  is accepted because  $p = 0.28 > \alpha = 0.05$  (Table 9).

*Table 9.*  
*Levene's Test of Homogeneity of Variances (II)*

### Test of Homogeneity of Variances

Percentage of men and women with different education who made purchases on the Internet in 2022.

Levene Statistic	df1	df2	Sig.
1.277	5	156	0.277

Source: (Eurostat, 2022)

The data on Table 10 show a statistically significant difference when comparing men with basic education to all other groups except for women with the lowest level of education. It can be observed that when comparing the mean percentage values between the two genders with the lowest level of education, the significance coefficient  $p > 0.05$ . This provides a basis to consider that there is no statistically significant difference between these groups. The arithmetic mean value of the variable in the group of men with secondary education also differs significantly from the other groups, except for the group of women with secondary education ( $p > 0.05$ ).

The results for the third educational category are similar. The mean percentage value of men with higher education, who made online purchases in 2022, shows a statistically significant difference compared to all other educational groups, except for women with the same level of education ( $p > 0.05$ ).

**Table 10.**  
**Multiple comparisons (II)**

<b>Multiple Comparisons</b>						
Dependent Variable: Percentage of men and women with different education who made purchases on the Internet in 2022.						
Tukey HSD						
(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Men with low formal education	Women with low formal education	1.1159	4.1609	1.000	-10.890	13.122
	Men with medium formal education	-17.4233*	4.1609	.001	-29.430	-5.417
	Women with medium formal education	-18.3019*	4.1609	.000	-30.308	-6.296
	Men with high formal education	-36.1263*	4.1609	.000	-48.133	-24.120
	Women with high formal education	-37.6178*	4.1609	.000	-49.624	-25.612
Women with low formal education	Men with low formal education	-1.1159	4.1609	1.000	-13.122	10.890
	Men with medium formal education	-18.5393*	4.1609	.000	-30.545	-6.533
	Women with medium formal education	-19.4178*	4.1609	.000	-31.424	-7.412
	Men with high formal education	-37.2422*	4.1609	.000	-49.248	-25.236
	Women with high formal education	-38.7337*	4.1609	.000	-50.740	-26.727
Men with medium formal education	Men with low formal education	17.4233*	4.1609	.001	5.417	29.430
	Women with low formal education	18.5393*	4.1609	.000	6.533	30.545
	Women with medium formal education	-.8785	4.1609	1.000	-12.885	11.128
	Men with high formal education	-18.7030*	4.1609	.000	-30.709	-6.697
	Women with high formal education	-20.1944*	4.1609	.000	-32.201	-8.188
	Men with low formal education	18.3019*	4.1609	.000	6.296	30.308

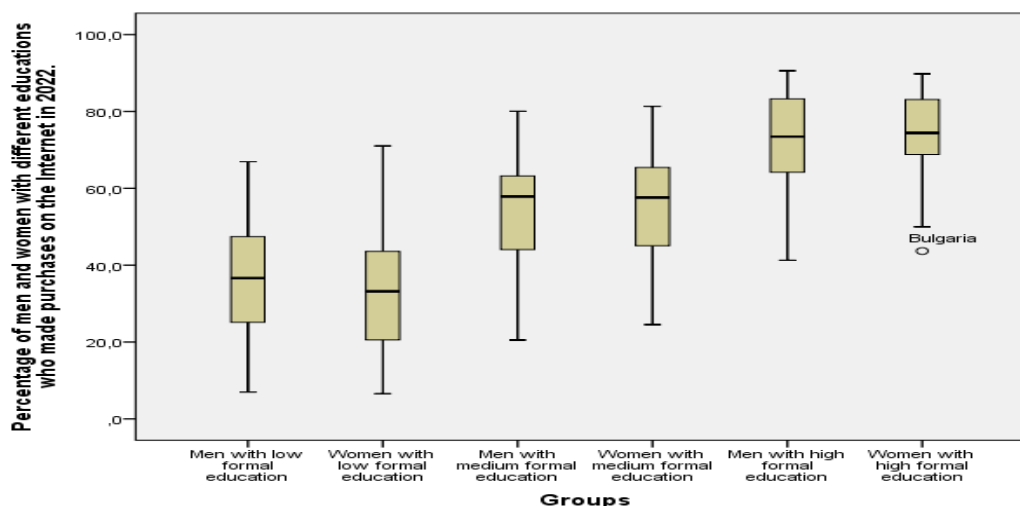
## ANALYSIS OF THE BEHAVIOUR OF ONLINE CONSUMERS FROM ...

Women with medium formal education	Women with low formal education	19.4178*	4.1609	.000	7.412	31.424
	Men with medium formal education	.8785	4.1609	1.000	-11.128	12.885
	Men with high formal education	-17.8244*	4.1609	.000	-29.831	-5.818
	Women with high formal education	-19.3159*	4.1609	.000	-31.322	-7.310
Men with high formal education	Men with low formal education	36.1263*	4.1609	.000	24.120	48.133
	Women with low formal education	37.2422*	4.1609	.000	25.236	49.248
	Men with medium formal education	18.7030*	4.1609	.000	6.697	30.709
	Women with medium formal education	17.8244*	4.1609	.000	5.818	29.831
	Women with high formal education	-1.4915	4.1609	.999	-13.498	10.515
Women with high formal education	Men with low formal education	37.6178*	4.1609	.000	25.612	49.624
	Women with low formal education	38.7337*	4.1609	.000	26.727	50.740
	Men with medium formal education	20.1944*	4.1609	.000	8.188	32.201
	Women with medium formal education	19.3159*	4.1609	.000	7.310	31.322
	Men with high formal education	1.4915	4.1609	.999	-10.515	13.498

\*. The mean difference is significant at the 0.05 level.

Source: (Eurostat, 2022)

In the next stage of the analysis, the presence of variables from the three levels of education with extreme values compared to other observations is sought. The constructed quartile diagram highlights the presence of only one moderately low extreme value among women with higher education from Bulgaria (Fig. 2), indicating that they shop online significantly less compared to the same indicator for the other EU member states.



Source: (Eurostat, 2022)

Figure 2. Box plot (II)

The scientific study further focuses on testing for the presence of a statistically significant relationship between the percentage of online users from the EU and their belonging to the categories of "professionals" in the field of Information and Communication Technology (ICT) and "non-professionals" in this domain, i.e., the analysis includes users with or without professional knowledge in information technology, hardware and software applications.

The data from the next table of the analysis show that the average percentage of online users from the "professionals" group is 84.8%, which is approximately 21% higher than the users belonging to the "non-professionals" group (Table 11).

Table 11.  
Observation Report (III)

### Report

Percentage of ICT professionals and non-ICT professionals who made purchases on the Internet in 2022

Groups	Mean	N	Std. Deviation
ICT professionals	84.778	26	11.7578
Non-ICT professionals	63.863	27	16.5106
Total	74.123	53	17.7255

Source: (Eurostat, 2022)

To confirm the existence of a statistically significant relationship between the percentage of online users from the EU who made online purchases in 2022 and their belonging to one of the categories "professionals" or "non-professionals", the following hypotheses are formulated:

- $H_0$ : there is no statistically significant relationship between the percentage of online users from the EU and their belonging to one of the groups;

- $H_1$ : there is a statistically significant relationship between the percentage of online users from the EU and their belonging to one of the groups.

It is evident from the data that the significance coefficient  $p < \alpha = 0.05$ , therefore, the null hypothesis  $H_0$  is rejected (Table 12). This confirms the presence of a statistically significant relationship between the percentage of online users from the EU and their digital skills.

Table 12.  
ANOVA (III)

			ANOVA Table				
			Sum of Squares	df	Mean Square	F	Sig.
Percentage of ICT professionals and non-ICT professionals who made purchases on the Internet in 2022 * Groups	Between (Combined Groups)		5794.248	1	5794.248	28.027	0.000
	Within Groups		10543.742	51	206.740		
	Total		16337.990	52			

Source: (Eurostat, 2022)

Next, the strength of the relationship between the percentage of online users from the EU and the level of their digital skills is measured. From the data in Table 13, it can be seen that the coefficient of determination Eta Squared ( $\eta^2$ ) has a value of 0.36 or 35.6%. This means that 35.6% of the differences in the percentage of online users from the EU in 2022 can be attributed to the fact that they belong to one of the groups "professionals" or "non-professionals" in the field of ICT, and the relationship between the factor and the result can be considered strong. In this case, with two observed groups, a Post hoc test is not conducted.

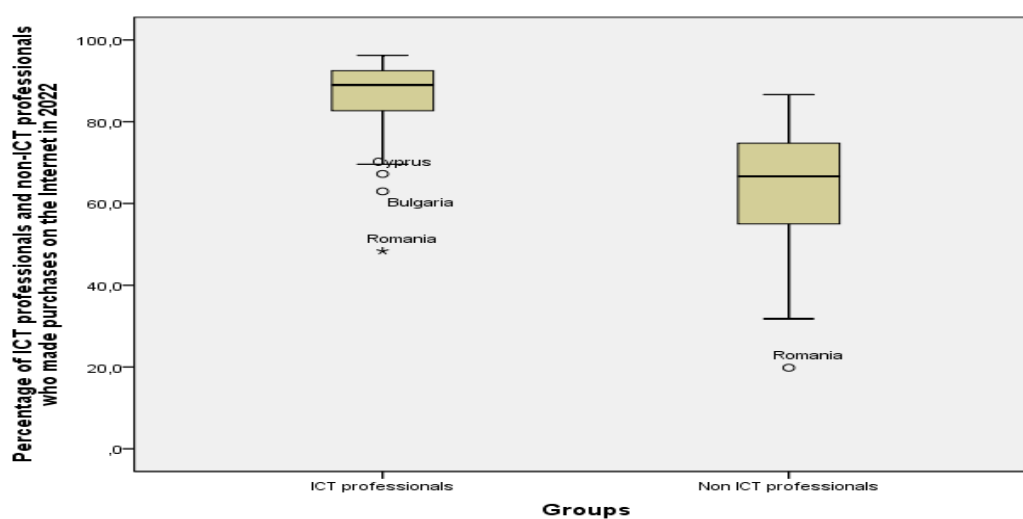
Table 13.

*Strength of the relationship between the percentage of users who made online purchases in 2022 and the categories "professionals" and "non-professionals" (III)*

Measures of Association		
	Eta	Eta Squared
Percentage of ICT professionals and non-ICT professionals who made purchases on the Internet in 2022 * Groups	0.596	0.355

Source: (Eurostat, 2022)

By constructing a box plot, it is checked whether there are extremely low or high values in the two examined groups (Fig. 3). In the first group, two moderately low extreme values stand out – the percentage of online users from Cyprus and Bulgaria. There is also one extremely low extreme value (\*) – the percentage of online users in Romania. The conclusions that can be formulated from the graphical analysis are that "professionals" in the field of ICT from Cyprus, Romania and Bulgaria who shop online are significantly fewer than other EU users, belonging to the "non-professionals" group. In the second category, there is only one moderately extreme value, which is observed for Romania. It turns out that the percentage of online users from Romania who are not ICT professionals is exceptionally lower than that of online users from the other 26 member states.



Source: (Eurostat, 2022)

*Figure 3. Box plot (III)*



Given the complexity of the relationships between e-commerce platforms and a significant customer base, the study takes into account the fact that the exposed risks in online trading concerning marketing and logistics practices are dependent not only on macroeconomic, political and climatic conditions but also on the attitudes and capabilities of end consumers.

The present study adds value not only to theory but also to practice by bringing out useful information on the development of online shopping across a wide geographical area. The results of the study can serve as a stimulus for a new orientation of European business in trade, namely additional concentration of entrepreneurial efforts and strategies in the direction of modernization of online platforms and improvement of the organization of trade processes. The conclusions of such analyses can be included in government and business programs aimed at improving digital skills in lagging European countries and prevention against the negative impact of potential economic, social and health restrictions.

### **Conclusion**

The results of the study on statistically significant relationships and their strength confirm the thesis that the activity of online users from the EU is influenced by determinants such as gender, age and digital skills. The analysis shows significant differences between the percentage of online users aged 16 to 54 years and those exceeding this age. The youngest men and women, as well as those in middle age, shop online much more frequently than people over the age of 55. The conclusions indicate that age is a determining factor for the percentage distribution of online users in the EU.

For the countries Bulgaria, Romania and Cyprus, moderately extreme values for the percentages of online users in the lowest age group of men and women, who made online purchases in 2022, are observed.

The level of education of men and women also serves as a significant factor for online consumer activity in e-commerce. With an increase in educational level, users more frequently take advantage of online offers for purchasing goods and services. Men and women with the lowest level of education rarely shop online, while those with higher education demonstrate high activity in online transactions. The only moderately low extreme value of the observed variable is noted for online female users with higher education

from Bulgaria, who are significantly fewer than online users from other age groups in the EU.

High levels of digital skills in the EU also stimulated more users with ICT knowledge to take advantage of online offers in 2022. During the study, it was established that "professionals" in the field of ICT who shopped online were significantly more numerous than "non-professionals". Extremely low values of the percentage of "professionals" shopping online are observed for Cyprus, Bulgaria and Romania, while among "non-professionals", an extremely low percentage value exists only for Romania. The author does not neglect the possibility of expanding the study on online consumer activity in the EU by measuring the influence of other determinants such as purchasing power, traditions and habits of buyers, the presence of distribution channels for online commerce, pricing policies of merchants, etc.

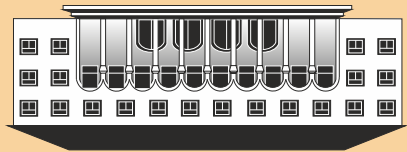
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4/2023



# БИЗНЕС управление

PUBLISHED BY  
D. A. TSENOV ACADEMY  
OF ECONOMICS - SVISHTOV

ISSN 0861 - 6604  
ISSN 2534 - 8396

BUSINESS management

4/2023

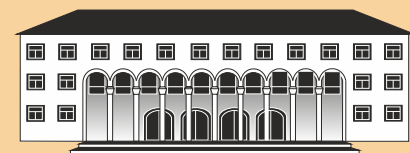
4/2023

БИЗНЕС управление

ISSN 2534 - 8396  
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ИЗДАНИЕ НА  
СТОПАНСКА АКАДЕМИЯ  
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*The printing of the issue 4-2023 is funded with a grand from the Scientific Research Fund, Contract KP-06-NP4/75 /16.12.2022 by the competition “Bulgarian Scientific Periodicals - 2023”.*

Submitted for publishing on 22.11.2023, published on 23.11.2023, format 70x100/16, total print 80

© D. A. Tsenov Academy of Economics, Svishtov,

2 Emanuil Chakarov Str, telephone number: +359 631 66298

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# **BUSINESS** **management**

D. A. Tsenov Academy  
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Year XXXIII \* Book 4, 2023

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